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A New Approach for Thermodynamic Studies on Binding of Some Metal Ions with Human Growth Hormone

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Abstract A thermodynamic study on the interaction between Mg^{2+}, Ni^{2+} and Co^{2+} ions (M^{2+}) and human growth hormone (hGH) was made at 27 °C in aqueous NaCl solutions using isothermal titration calorimetry. Gholamreza Rezaei Behbehani's solvation model (GRB) was used to model the enthalpies of M^{2+} + hGH interactions over the studied range of metal ion concentrations. The solvation parameters derived from the solvation model were attributed to a structural change of hGH due to its interactions with the metal ion.

Keywords Isothermal titration calorimetry · Human growth hormone (hGH)

1 Introduction

Human growth hormone, hGH, is a single domain globular protein containing 191 amino acids, which plays an important role in somatic growth through its effects on the metabolism of proteins, carbohydrates, and lipids. The compound hGH is also produced recombinantly, and is available worldwide for clinical use. It has limited stability in aqueous solution. Development has therefore focused on its more stable complexes and understanding on its interaction with ligands. The interaction of hGH with some of divalent metal ions (Ca^{2+} and Cu^{2+}) in aqueous solution was studied using different techniques. The binding isotherm for hGH + metal ion was obtained by two techniques: by potentiometry using a metal-selective membrane electrode, and by isothermal titration calorimetry. A circular dichroism

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